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THE
OPHTHALMIC RECORD.

VOL. IV. MARCH, 1895. No. 9.

THE EIGHTH PERIODICAL INTERNATIONAL OPHTHALMOLOGICAL CONGRESS, HELD AT EDINBURGH, AUGUST 7-11, 1894.*

By ALVIN A. HUBBELL, M.D., Buffalo, N. Y.

(*Concluded from page 293.*)

PRIESTLY SMITH (3) had done the scleral punctures as an adjunct to iridectomy in the treatment of glaucoma fifty times in non-congestive cases under cocaine anesthesia, in others under chloroform. A valvular puncture is made with a von Graefe's cataract knife introduced through the sclera at least five millimeters back of the corneal margin and then rotated and removed. A small leaking puncture remains. No internal hemorrhage has ever occurred. After iridectomy it prevents the lens being pushed forward; before iridectomy it has the same effect. It may be of use in some cases where iridectomy is inadvisable.

Abadie said that he had seen many glaucoma patients subjected to sclerotomy, but not one had ever been definitely cured, while iridectomy had preserved the sight of many. He accepted Priestly Smith's method of puncture as a means of facilitating iridectomy, but without attributing to it any curative value.

Parent had had recourse to puncture of the sclera several times and always with complete satisfaction.

*With the consent of Drs. Hubbell and Potter, this report is republished from the *Buffalo Medical and Surgical Journal.*

Pflüger had for several years used posterior sclerotomy in severe cases of glaucoma as a preliminary to iridectomy, and his experiences coincided precisely with those of Priestly Smith.

McHardy, of London, had found the iridectomy complicated and not facilitated, immediately after the scleral puncture, from the marked softening that the latter produced. He made very large iridectomies in glaucoma and in the malignant form he obtained successful results by extracting the lens.

Power had performed an operation which he said was almost identical with that of Priestly Smith and which was originally proposed by Mr. Hancock, of the Royal Westminester Ophthalmic Hospital. It was done with a Beer's knife, which was passed into the vitreous through the sclera three or four millimeters from the margin of the cornea. It is in acute glaucoma that it is most successful. He had almost given up operating in chronic glaucoma.

Menacho had practised the old posterior sclerotomy and was satisfied that it was efficacious in relieving the acute symptoms of glaucoma.

Priestly Smith concluded the discussion by reminding his hearers that his paper referred to scleral puncture as an *adjunct to iridectomy* and not as an independent operation. The withdrawal of a small quantity of fluid from the vitreous chamber does not, cannot, in fact, immediately alter the depth of the anterior chamber.

Mules (6 *a*) had performed a new operation for ptosis, in which a small elliptical piece of cartilage is removed, and by wires, carried to half an inch above the eyebrow, the lid is drawn up to the required degree.

Little had seen the good results in a case operated on by Mules.

Pfluger (7) recommended drainage of the anterior chamber in infections of it, as well as in keratoconus and in some cases

of glaucoma and detachment of the retina. He uses a small piece of guttapercha in the form of a cross, the short part being introduced through an opening in the cornea to the depth of about two millimeters into the anterior chamber. The other parts are fixed under the conjunctiva. If injections into the anterior chamber are necessary, this drain must be frequently changed. In conical cornea it may remain several days and its use should be often repeated.

Walker (8) had devised the following operation for relieving tension in chronic glaucoma: Dissect a small flap of conjunctiva about three to six millimeters close to the edge of the cornea; then thrust a small knife, with the base toward the iris, into the anterior chamber at the margin of the corner and into this opening push the conjunctival flap.

The epithelial surface of the conjunctiva not uniting with the cornea, a permanent fistula and continuous drainage are established.

Landolt (28), after twenty years' attention to strabismus, had come to the conclusion that, in its correction, muscular advancement was better than tenotomy. After tenotomy the excursions of the eye are often limited, the caruncle often becomes retracted, the power of the operated muscle weakened and the eye sometimes has the appearance of being more prominent than the other. On the other hand, advancement gives results as good and complete without any of the drawbacks of a tenotomy and it is without danger. For example, there is no risk of over-correction, no insufficiencies, no retraction of the caruncle and no malposition of the eyeball.

In convergent strabismus he preferred to simultaneously advance both external recti muscles and follow the operation by orthoptic exercises. In muscular insufficiencies or slight strabismus a unilateral advancement would be sufficient. In divergent strabismus a tenotomy of the external rectus gives only a metric-angle of correction, while a complete correction

may be obtained by advancement of the internal rectus.

It is only in high degrees of strabismus that he combined a tenotomy of the antagonistic muscle with an advancement, and then the tenotomy is done sub-conjunctivally and without further detachment from the surrounding tissues.

Swanzy did not think that simple tenotomy should be discarded in favor of advancement to the extent recommended by Landolt. He believed the rules of von Graefe still hold good. He never used advancement alone, but frequently combined tenotomy with it in extreme cases. He found difficulty in deciding how much of the tendon should be removed to produce the desired effect. He also found that advancement sometimes causes disfigurement by reason of an unpleasant red lump being produced at the point of the new insertion. Does Landolt have any difficulty in securing a flat cicatrix?

Pannas was of the same opinion as Landolt in regard to the superiority of advancement, especially in cases due to paralytic insufficiency. In concomitant strabismus, on the other hand, in which the equilibrium is not disturbed by paralysis or retraction, but by insufficient convergence, tenotomy is more certain. Advocates of advancement admit that it frequently fails to afford relief in the divergent strabismus of myopia. For these reasons he employs advancement merely as an adjuvant to tenotomy in marked divergent and in acute paralytic strabismus.

Roosa had used the method of advancement as a substitute for, or as an adjuvant to, tenotomy in very high degrees of convergent strabismus, or when one or more tenotomies had been performed. But to substitute advancement for tenotomy on account of the danger of diplopia, was to make a change from a slight to a more serious operation. Advancement should not be used as a general substitute for tenotomy. All refractive errors should be corrected.

Gruening, of New York, endeavored to avoid the more serious

operation of advancement and obtained very satisfactory results, even in divergent strabismus, by the simple operation of tenotomy.

Stevens said that equality of rotation in all directions must be maintained in order to obtain the best results in strabismus operations and the perfect union of images in all positions. To maintain such equality, relaxation of corresponding muscles must be made. Tenotomy of one muscle and shortening of its opponent of the same eye is inconsistent with this principle. He believed that in most cases of strabismus the defect may be relieved and binocular vision obtained with perfect rotation in all directions by carefully graduated tenotomies on both eyes to be repeated after some months. But in every case the various forces are to be regarded.

Landolt replied that the criticisms of his esteemed colleagues proved that they do not examine, treat, operate or follow up their patients as he had done. Not one, for instance, had mentioned the measurements of the excursions of the eyes, of convergence, or of divergence, before or after operation. Yet this should be done. He agreed that great stress should be laid upon the correction of optical defects in the cure of strabismus. Operation is not sufficient to do away with a squint, but is only a step in a long and carefully directed orthoptic line.

Thier (31) had operated on thirty-eight cases of high myopia by discission and absorption of the crystalline lens. He passes the knife through the whole thickness of the lens and the posterior capsule. Rapid swelling of the lens is desired, and if cloudiness and swelling do not develop within eight or ten days he repeats the discission. Young patients are most suitable, but he had operated in one case successfully at forty-eight years of age.

He had operated on thirty-eight patients. In eleven he had operated on both eyes, and in sixteen on one eye. In nearly all a marked improvement of vision had been produced.

Fukala (32), in speaking on this same subject, said that he operated by discission and followed this by paracentesis and evacuation of the lens. He operated on all suitable cases under forty years of age, avoiding those affected with chronic choroiditis or detachment of the retina. He was opposed to the immediate extraction of a transparent lens, as he thought it liable to be followed by a dangerous hyperemia of the choroid.

Schmidt-Rimpler (Göttingen) considered it necessary to watch the patients for a long time after one of these operations. In one case, operated by discission on one eye, the myopia had progressed in the same manner in the aphakial eye as in the other, with the development of the same choroidal lesions. From this he concluded that, in young persons, the double operation was preferable.

Pflüger had operated on forty cases with good results. He differed with Thier and Fukala in believing that choroidal changes are not a contra-indication. There are few cases of high myopia without them. He does not dare to divide the lens as deeply as does Thier, for the vitreous humor might pass into the anterior chamber and out through the corneal wound. The tension should be watched after discission, and if it occurs it may be controlled by repeated paracentesis.

Thier, in reply, said that with good antisepsis he had little fear of the presentation of the vitreous outside, and the large discission hastened the termination of the treatment and left an unobstructed pupil. Furthermore, the contraction of the capsule, which might otherwise occur and cause irritation, is prevented.

Fukala said that, as a contra-indication to the operation, he referred to those choroidal changes which affected the macula and those which caused numerous exudates into the vitreous.

Noyes (33) described an operation which he had performed in a case of closure of the pupil from irido-cyclitis after cataract extraction. With a von Graefe's cataract knife he makes a

section on each side of the cornea,and before withdrawing the knife plunges the point into the iris near the center. If there is hemorrhage he injects into the anterior chamber saline water by one of these openings and out by the other. When the hemorrhage ceases, he incises the iris with de Wecker's scissors, on both sides. The hemorrhage is again treated by saline injections into the anterior chamber, as before. Finally, the flap of iris is drawn out, on either side, by a hook and cut off.

Darier referred to a similar operation which had been done by Abadie, in which the iris was incised in the form of a V and the iris flap drawn out from the opposite side and cut off.

McHardy (41) reported the results of treatment of immature cataract by preliminary iridectomy with trituration of the lens. He had had three different series:

	1st Series.	2d Series.	3d Series.
Number of cases	25	100	49
Unduly early extraction required	4 per cent.	2 per cent.	4 per cent
Second and third trituration required	28 " "	9 " "	4 " "
Troublesome, but controlable, iritis	12 " "	17 " "	2 " "
Slight loss of vitreous during extraction	28 " "	Not noted.	4 " "
Total failure to restore sight	None.	3 per cent.	None.

Comparative observations were also made in cases in which a preliminary iridectomy had been done with and without trituration:

	With Iridectomy.	Without Iridectomy.
Cases	38	21
Cortex semi-fluid, non-sticky	80 per cent.	
" sticky	None.	33 per cent.
" hard	20 per cent.	66 " "
Cystoid cicatrix	2 " "	10 " "
Secondary capsulotomy	21 " "	35 " "

He had been using this method of trituration of the lens for nine years. He obtained complete ripening in immature senile cataracts in from eight days to eight weeks, and the procedure was a safe one. He has the eye well under the influence of atropine at the time of the preliminary operation. After waiting six to eight weeks, he extracts with as much safety and as good results as in cases where the maturity was spontaneous, and it was free from the evil effects which follow the removal of immature cataracts.

Noyes believed there was a place for trituration of immature cataracts. He found the indication in cases of soft cataracts, with broad striæ, which, if operated on, would leave a large quantity of cortex behind to excite iritis and produce a bad secondary cataract. But this trituration and maturation can be perfectly well done without iridectomy. Within the past five years he had operated on cases of sclerosed lenses, regardless of the amount of transparency, and he had found that where sclerosis of the nucleus could be discerned, the cortex was as perfectly evacuated as if the whole lens were opaque. The incision included almost half of the cornea, no iridectomy was done, and, if some obscurity resulted, irrigation with a warm physiological solution of common salt cleared the pupil. The stream was directed by a rubber bulb, without introducing its point into the wound. He felt less anxiety, however, in a case in which the lens was fully opaque.

Hill Griffith, of Manchester, had employed trituration with advantage, and recalled some of his experience.

Theobold (43) advocated the use of large probes in the treatment of strictures of the nasal duct, and described his probes and his method of using them, all of which has long been familiar to American ophthalmologists.

Grüning had had excellent success with Theobold's probes, and confirmed Theobold's experience.

Roosa was not in favor of Theobold's method exclusively. Many cases are purely those of catarrh, and not of stenosis, and very little and simple treatment is often all that is necessary. He was well satisfied with his own results in employing Bowman's method, with such deviation as would suggest itself to an intelligent man.

Thompson, of Indianapolis, had treated such cases during the last twenty-three years by all sorts of methods. He began with large probes about fourteen years ago and had used them in every way, frequently and less often, and in some instances

"large enough for a horse." Yet he has had patients return in less than a year, sometimes earlier, with the ducts just as small and the disease as bad as before treatment.

Risley, of Philadelphia, thought the treatment by large probes was opposed to the normal physiological process. An opening in the canaliculus sufficiently large to admit the largest of Theobold's series, destroyed the physiological relation and function of the parts. The lachrymal duct, in its normal condition, is a capillary tube and not a drain-pipe.

Chibret, in view of the fact that probing does not cure all cases of epiphora, had found much relief in diminishing the amount of secresion by ablation of the inferior lachrymal gland, according to the method of de Wecker. This reduced the secretion to one fourth.

Priestly Smith favored wearing for long periods lead or silver probes, with the upper end bent so as to lie in the open canaliculus.

Lee, of Liverpool, recommended prolonged irrigation of the lachrymal passages, through a perforated tube, with some antiseptic fluid, particularly in blennorrhea of the sac and duct.

Argyll-Robertson said that he had been personally cognizant of the employment of very large probes for eighteen years, which were introduced by Mr. Couper, of London, and he thought that such credit as attaches to this procedure should be given to him.

Theobold closed the discussion by saying that relapses undoubtedly occurred after treatment by his method, but such relapses were extremely rare. He thought their employment did not destroy the drainage-function of the passages.

Stoelting (44) had performed repeated sclerotomies for hydrophthalmia, the patient being under chloroform anesthesia to prevent all sudden movement. The eyes are then bandaged closely, the first time for three days, and the second for two days, each time under chloroform. On the fifth day myotics

and cold compresses are used. For each eye two sclerotomies were necessary. The process of cure lasted on an average fifty days.

Gutmann believed congenital hydrophthalmia is curable, if an operation is done early. He had found better results from iridectomy than sclerotomy.

Pflüger had been unfortunate in operating on many cases. The only case in which the cornea returned to its normal size and transparency, as well as function, was treated by sclerotomy, but as a routine method this operation cannot be recommended.

Thier thought good results could be obtained not only from iridectomy, but also from sclerotomy.

Dufour believed that, if the intra-ocular pressure could be reduced, even for a short time, the hydrophthalmia would be relieved. Myotics would sometimes do this; but if they failed, an operation would be necessary.

Malgat (45) had concluded that medical and hygienic treatment of conjunctival granulations were as imperative as surgical measures. For the surgical treatment he employed electrolysis, using a simple Gaiffe battery of seven pairs, provided with a rectilinear collector. The conductor carrying the needle is connected with the negative pole. With this every granulation (trachoma) is destroyed by applying the point of the needle successively to each one. Several sittings are required at intervals of two or three days. It is necessary to reverse the upper eyelid so as to expose the upper retrotarsal fold or resort to excission of it. The conjunctiva becomes smooth and normal without a trace of cicatrization. The electrolysis acts chemically, antiseptically, and as a means of modifying diseased tissues.

Chibret had investigated the etiology of trachoma for twenty years, and he believed that sun and air had nothing to do with its production, but that it was principally a disease of race, as

had been shown by Swan Burnett, Hirschberg and himself.

Chavallereau (47) submitted a paper describing two cases in whom paralysis of the ocular-motor nerve persisted eight months and six and one half months, respectively, in spite of medical treatment. He cut the external rectus muscle in each case and the paralysis entirely disappeared.

MISCELLANEOUS PAPERS.

Leber (23) recommended a new method of hardening and preserving eye-specimens by means of formol. The active principle of formol is formaldehyde, which is dissolved in water, to which is added a little methelic alcohol in the proportion of 40 to 100. To harden an eyeball the formol should be mixed with ten to thirty parts of water, the best proportion being about one to ten. Formol had been recommended the year before by Dr. F. Blum for the preservation of vegetable and animal substances, and later by Dr. Edinger for the eyes.

Formol has no attraction for water, hardens tissues by coagulation, and no shrinking takes place. It acts as a fixitive for histological structures, requires a very short time (from one to a few days), the colors, and even a part of the transparency of the media are preserved, the vitreous remains transparent and keeps its normal consistence and the common procedures of staining and embedding in celloidin, or paraffin, can be applied as well as after hardening in Müller's fluid, or by other methods, and no washing out of the hardening substance is necessary. After hardening, the specimens can be preserved in the same fluid, or they may be mounted in glycerine jelly.

Swan Burnett (35) defended that system of measuring and designating prisms which made the prism-diopter (P. D.) or the centrad (Cr.) the standard or unit. He suggested as an exponent the sign △, instead of that of the degree (°).

Savage (48) read a paper on the relation of oblique astigmatism to the oblique muscles of the eyes and gave practical demonstrations of the principles for which he contended. This sub-

ject is so new and its importance seems so great that quite a full abstract is hereby submitted.

The simple function of the oblique muscles is to counteract the torsion effect of the action of the superior and inferior recti and also of the external and internal recti, if by malposition these are inserted too high or too low. In other words, their function is to keep the normal vertical meridian of one eye parallel with that of the other in obedience to the law of corresponding retinal points. In oblique astigmatism the retinal images are distorted, and in obedience to the same law, the oblique muscles are further brought into action to harmonize the retinal images. Thus when the meridians of greatest curvature diverge above, the superior obliques make the effort to harmonize the images, and when they converge above, the effort falls on the inferior obliques.

In applying a cylindrical glass for the correction of astigmatism, whether myopic or hypermetropic, there is in every case an arc of distortion for the superior obliques, and also an arc of distortion for the inferior obliques. These two arcs always make 180°, but are not always equal. They are equal only when the axes of the cylinders are required at 90° or 180°. For plus cylinders the arc of distortion for the superior obliques is always wholly or in greater part in the lower temporal quadrant, while the arc of distortion for the inferior obliques is always wholly or in greater part in the lower nasal quadrant. The reverse is the case with the minus cylinders. The arc of distortion for the superior obliques is not always equal to the arc of distortion for the inferior obliques, but the one always supplements the other so as to make 180°. To illustrate: If the arc of distortion for the superior obliques is 120°, that for the inferior is 60°. The point of maximum distortion in either of these arcs is just 45° from the vertical. The practical feature of this matter resides in the fact that we have within our power, by temporary rotation of cylinders, either plus or minus, in

the proper arc from 5° to 10°, to relieve the patient of metamorphopsia and other uncomfortable symptoms which are so common in the great majority of cases of oblique astigmatism. Gradually these cylinders must be rotated back to the proper point, when the patient will remain comfortable. This is of special importance in cases where the obliques are insufficient. As the author of the paper has before stated, insufficiency of the superior obliques is a very common condition, therefore, whenever oblique astigmatism is such as to call into activity the inferior obliques, it becomes a matter of very great importance in correcting this condition, to resort to the rotation of the cylinders so as to gradually transfer work from the inferior to the superior obliques. To illustrate: We have a case of hypermetropic astigmatism of 2. D., the meridians of the greatest curviture converging above. This uncorrected astigmatism distorts the images so as to throw a greater amount of work on the inferior oblique muscles. Correct this astigmatism by a plus cylinder, the distortion is at once relieved, and the work to which the inferior obliques have been accustomed is at once transferred to the superior. The latter being weak, they do not take this extra work kindly. By revolving the axes of these cylinders towards 90° for each eye, through an arc of 5° or 10° the images are distorted in the same way that the astigmatism itself distorts them, but objects are seen more sharply than if the lenses had not been given. This artificial distortion while sharpening the images leaves an excessive amount of work to be done by the inferior obliques. Gradually the cylinders are revolved back to their proper positions, and in this way, by small degrees, the work is transferred from the inferior obliques to the superior.

INSTRUMENTS.

Darier (13) exhibited aseptic collyria, an aseptic case for dressings, and a form of instrument for the shadow-test.

Risley (38) also showed an apparatus of his own construction for the shadow-test.

Ayers (39) presented a forceps for removing tarsal cysts and granulations of the conjunctiva.

THE NEXT MEETING OF THE CONGRESS.

After the conclusion of the reading of the papers, the congress then took up for consideration the question of the place and time of the next meeting. Prof. Snellen, on behalf of his Dutch Colleagues, invited the congress to hold its next session in Utrecht, Holland, and assured the members that they would do all in their power to make it interesting and profitable. He proposed that it be held in about five years hence, but at such a date that it would not clash with the meeting of the International Medical Congress.

Dr. Meyer, of Paris, said he had been commissioned by the Ophthalmological Society of Paris, and also by his French colleagues, to invite the congress to hold their next session in Paris in 1900, when the great international exhibition would be open in that city. Meetings of many other scientific bodies would be held at that time, and he thought it would be a good time and place for this congress. He could assure the congress of a most cordial and fraternal welcome.

Prof. Hansen-Grut, of Copenhagen, seconded the proposal of Dr. Snellen. He was afraid, if they were in Paris in 1900, there would be so many things to be seen outside that very little work wonld be done by the congress.

On putting the question to vote, the invitation and proposal of Prof. Snellen were accepted.

Prof. Snellen thanked the congress for this decision, and named as associated with himself on the committee of organization, Dr. Hansen-Grut, of Copenhagen; Dr. Doijer, of Leyden; Dr. Argyll-Robertson and Dr. Berry, of Edinburgh.

CLOSING OF THE CONGRESS.

At this point Dr. Noyes, of New York, took the platform, and,

in a felicitous speech, proposed that hearty thanks be given to the official authorities of the University, and also to the College of Physicians and the College of Surgeons, for the complete, satisfactory, and agreeable manner in which they had put at their disposal the facilities which the congress had enjoyed. He recalled a visit which he made to Edinburgh thirty years ago, and, noting the great expansion which the city had undergone in the interval, said he had been told that that expansion was due not to expansion in trade, in commerce, or in things of material character, but had been due to the expansion of learning. He commended the University for having chosen as the symbol which crowned the dome of its old buildings the figure of a youth looking forward to the career in front of him. That symbol represented an idea. It represented the beginnings of what they themselves were deeply concerned in. They were men of varied periods of life, but he was perfectly sure there was not one who had come to that meeting—coming as they had done from all parts of Europe and America—in whom did not burn the thirst for learning. In that institution they found a flame which would still further illuminate and warm their hearts; and for all that those gentlemen had done in helping to carry forward successfully the meeting which now came to a close, he was certain that they would unite with him in rendering them most sincere and hearty thanks (applause). He begged to couple with his proposal a vote of thanks to the officers of the congress and to the members of the medical profession in the city (applause).

Sir William Muir, the principal of the University, acknowledged the vote of thanks on behalf of the University, expressing his sense of the great service which the ophthalmological congress rendered, not only to medical science, but in the relief of humanity. Dr. Young, Treasurer of the Royal College of physicians, and Dr. Littlejohn, President of the Royal College of Surgeons, returned thanks on behalf of their colleges, and ex-

pressed the pleasure they had experienced in entertaining the congress. The congress then rose.

[Since the above was in type the official transactions of the congress have been received, and it is found that several additional valuable papers are published therein, which were presented, but not read at the congress. These will be abstracted and published next month. A. A. H.]

PHYSIOLOGICAL TORSION VERSUS "INSUFFICIENCY OF THE OBLIQUES." A REPLY.

By F. B. EATON, M.D.
Prof. of Ophthalmology and Otology, Med. Dept. University of Oregon, Portland, Oregon.

In the October number of the OPHTHALMIC RECORD, the editor offered me space "to state the nature of the objectionable influence" I claim is exerted by his theories upon the therapeutic practice of those who accept them. He also expresses a doubt as to the correctness of my method of examination, since I can find no eyes which do not exhibit torsion (rotation on the visual axis), in convergence, while he finds but 25%. It is perhaps needless to state in general, that I believe his theories are harmful because I believe them to be erroneous, and therefore lead to erroneous practice, the results of which, while less immediately apparent than erroneous treatment of a corneal ulcer, are none the less real. Life is too short, and art too long, to justify loss of time and energy in following misleading paths. As to the claim that "we have cured hundreds of cases," I may be pardoned for calling attention to the fact that the history of religion and medicine is full of instances of astonishing successes attributed to certain beliefs and theories which time has nevertheless relegated to oblivion. I do not impugn Dr. Savage's cures, but I do impugn his assumptions unsupported by proof; his interpretation of the real conditions producing the asthenopia, as well as the real nature of the in-

fluences which removed these conditions, since the reports of his cases omit mention of many data necessary to a just conclusion as to etiology and treatment.

As the justness of my assertions depends upon my proving that the phenomena upon which are erected these theories concerning the oblique muscles, are physiological and in accordance with the teachings of physiologists of the highest authority, before describing my experiments and method of examination, I will ask the reader's attention to the following law governing the motions of the eyes, and its restatement by Helmholtz. It is generally misunderstood, and in consequence, the position of the vertical meridian of the retina, and hence that of the whole retina and eye-ball, is incorrectly stated in nearly every text-book which discusses the subject. This has given rise to confusion and misunderstandings, and has led the editors of the RECORD to think I do not mean what I say regarding the effect of raising or lowering the visual lines, upon the torsion of the eye, while they have attributed to the various ocular muscles, functions physically and anatomically incompatible, as well as contrary to Listing's law, which is thus formulated: "*When the visual line passes from the primary position to any other position, the angle of torsion of the eye in the second position is the same as if the eye had come to this second position by turning about a fixed axis perpendicular both to the first and second position of the visual line.*" Thus, in looking straight upward the visual line moves vertically in a vertical plane, and the only axis perpendicular to this course is the transverse horizontal axis of the eye. In looking straight to the right the visual line moves in horizontal plane, and the only axis of the eye perpendicular to this is the vertical.

To get a clear idea of the diagonal movements, it is *necessary* to take a hollow rubber ball, or an apple. Holding it in front of you, on a level with the eyes, thrust a probe or knitting-needle vertically through the side toward you; it will represent

the vertical meridian of the retina when the eye is in the primary position. Now thrust a long knitting-needle (so as to pass through the centre), diagonally from your left downward to the right, through the ball or apple. On rotating the ball backward on this axis, the imaginary pupil, which is away from you, will look upward to the right, but the needle representing the vertical meridian will be inclined backward to the *left;* the torsion is to the left. Rotating it from you, the pupil looks downward to the left, the torsion is to the left, for the meridian is inclined forward to the left. If these experiments be repeated with an axis passing downward to the left, on rotating the ball backward, the pupil looks upward to the left, but the vertical meridian inclines to the *right*, while rotating it forward, the pupil looks downward to the right, and the vertical meridian inclines forward to the *right;* the torsion is to the right. In the four diagonal movements the pupil moves in a straight line, there is no torsion on the visual axis. If, however, the diagonal position upward to the left, for instance, be attained by first rotating the ball backward on its horizontal transverse axis, and then to the left on its now backwardly inclined vertical axis, torsion *on the visual axis* takes place to the right, and the vertical meridian is now in the same position as when rotation took place on the fixed diagonal axis downward from right to left, directly from the primary position. And so with the other diagonal positions, torsion on the visual axis occurs whenever, with the visual line elevated or depressed, one secondary position passes into another, not in a line with the primary position.

We can now understand the laws of ocular motion deduced by Helmholtz from Listing's law and given in his "Physiologie Optik." "When the plane of sight is directed upward, lateral displacements to the *right* make the eye turn to the *left*, and displacements to the *left* make it turn to the *right*.

"When the plane of sight is depressed, lateral displacements

to the *right* are accompanied with torsion to the *right*, and those to the *left* with torsion to the *left*."

Now the error of the text-books, which has led to wrong diagnosis and practice, is due to confusing the *real* torsion of the eye with the *apparent* rotation of after-images of the vertical and horizontal meridians of the retina. Authors give the real torsion of the eye the same direction as the apparent inclination of after-images, whereas Helmholtz shows that it is exactly opposite to the latter. How the error is made, can be easily demonstrated with the ball and needle. If the ball be rotated from the primary position, backward on the needle thrust through it diagonally downward from left to right, the pupil will look up to the right (the ball being regarded from the rear). The needle representing the vertical meridian of the eye, will now be, with respect to a vertical line on a wall straight ahead, inclined to the left, this being the *real* torsion of the *eye*. But if the ball be held perfectly still in this position and the observer view it from the left side, the needle will be, with respect to a vertical line on the wall *now* back of it, inclined to the *right*, this being the *apparent* torsion of the eye and after-image, and so on, for all diagonal positions of the eye. The torsion I have termed *real*, is so, because the inclination of the vertical retinal meridian in reference to the vertical median plane of the head is termed by physiologists "the angle of torsion."

The bearing of these laws of Listing and Helmholtz upon the theory of "insufficiency of the obliques" is shown by the proof of the following propositions:

1. When the visual line is elevated, the tension of the internal rectus produces outward, and when depressed, an inward, torsion. The tension of the external rectus, in the same positions, produces torsion the opposite of this.

2. The influence of the oblique muscles in producing torsion,

is subordinate to, and relatively very slight compared with, that of the internal, external, and inferior recti.

3. In converging from the primary position to any point upward, or to any point more than forty-five degrees downward- Listing's law still prevails, the torsion being outward and in, ward respectively; but when converging downward from the primary position less than forty-five degrees, there is rotation outward on the visual axis in order to preserve corresponding points of the retina, and a surface of single vision, (horopter.) In passing from convergence above, to convergence forty-five degrees below the primary visual plane, the eyes, as in conjugate motion, rotate inward on their visual axes, and *vice versa*, but the vertical meridians are inclined outward from the median plane.

4. The use of prisms for the detection of torsion is misleading and unreliable, as they produce conditions and distortions which conceal or exaggerate the evidences of torsion.

1. The combined action of the muscles in producing rotation on the visual axis is thus illustrated by Hering: "This rotary motion does not require any peculiar innervation, this being already contained in the alteration in the course of the traction of the muscles in question. If the visual line be first raised by the combined action of the superior rectus and of the regulating inferior oblique, and if the internal rectus be innervated, this muscle no longer acts in a horizontal direction only. Its point of insertion is also elevated, and its belly forms a different angle with the visual line. Its tension must therefore cause a further elevation of the inner, that is a sinking of the outer, half of the horizontal retinal meridian, and with it an (outward E.) rotation around the visual line. * * * But what is true of the rectus internus with an elevated visual line, is also true of the externus when the visual line is lowered." We may add, that with a lowered visual line, for the reasons Hering has given, the tension of the internus rotates the eye inward on the

visual axis, this being the case when, with parallel visual lines, the eye looks downward and inward according to Helmholtz. But Dr. Price (See Ophthalmic Record November, pp. 184 and 198) imagines that the internal rectus can augment the outward rotating effect of the rectus inferior when the visual line is depressed, and accounts for this by a supposed displacement downward of the insertion of the internus, when it is clear that when the eye looks downward twenty-three degrees, especially in convergence, that the tendon of the internus makes the same angle with the visual line, that the rectus superior makes with it in the primary position, and that even if the tendon of the internus is inserted very low, as long as its traction is obliquely downward across the visual line, it must, like the rectus superior, produce torsion inward, being always, with depressed visual line, opposed to the rectus inferior as regards torsion.

2. But Drs. Savage and Price have attributed a torsional influence to the obliques they are far from possessing physiologically. For, since the superior and inferior recti make a traction angle of twenty-three degrees with the visual line in the primary position, and the obliques one of fifty-five degrees, therefore when the eye is turned inward sixteen degrees, the torsional and vertical tractions of each set of muscles is equal. When turned inward still further, the torsional effect of the recti predominates. Now, if with parallel visual lines, the eyes be turned straight downward, the superior obliques neutralize the outward torsional effect of the inferior recti; and if the eyes be turned from this position, twenty-three degrees to the left, the vertical meridians, according to the laws of motion, will be inclined forward to the left. Yet this torsion to the left is not produced by the obliques, but by the right internus and left externus, their traction being downward across the visual lines. In the right eye, the angle of traction of the inferior r. is now forty-six degrees with the visual axis, and that of the superior oblique only thirty-two degrees, yet the predominat-

ing outward torsional effect of the inferior r. is overcome by the internus. In the left eye, the inferior r. being coincident with the visual axis, has no torsional effect whatever, while that of the superior oblique is greatly increased, being at an angle of seventy-eight degrees with the visual line; yet the torsion is to the left in spite of the traction of the superior oblique, and can only be caused by the externus. Undoubtedly the obliques by their elastic tension and regulated innervation, aid in guiding these movements, and it must have occurred to others as well as myself, that the absence of diplopia or of any disturbance of the parallel movements of the eyes in distant vision in Dr. Savage's cases of "insufficiency of the obliques," is inconsistent with the existence of that condition in convergence, where he finds it, since it would lead to false positions of the retina during conjugate movements for distance.

3. For the determination of the nature and degree of torsion in convergence, I use a very simple bit of apparatus. A flat rod of wood, two feet long, one inch wide, and one quarter inch thick, carries two wooden collars; in one of these, a long hat-pin is inserted vertically, while the other carries a card or a small black-headed pin. One end of the rod is grooved to fit the bridge of the nose. When used, the grooved end is placed on the bridge of the nose slightly above the level of the interpupillary line when the eyes are in the primary position, the hat-pin being turned vertically downward, and behind it, the card with a dot on it in the median line and at a level with the pupils, or the small pin with its head at the same point. Sliding the hat-pin along the rod until it is thirteen inches from the eyes, and the card or short pin an inch behind it; the person examined looks at the latter, the rod being horizontal. The visual lines are now converged in the primary visual plane, and are perpendicular to the hat-pin, and mathematical perspective eliminated. While thus looking, crossed images of the hat-pin are seen, the left, which belongs to the right eye be-

ing inclined to the left and proving that that eye is rotated to the right on the visual axis (outward torsion), while outward torsion of the left eye is shown by the right image leaning to the right, the images meeting below, and diverging at their tops. If now the rod be elevated at its distal end, being careful to preserve the same relations of the head and eyes, the images will be seen to diverge at a greater angle; if it be lowered, the images are seen to become less and less divergent, until at a point forty-five degrees below the horizontal plane, as measured by a protractor, they become parallel to each other. Below forty-five degrees, they converge above, showing torsion inward. Referring to my third proposition, it will be seen that nearly all therein asserted is proven by this experiment, since the hat-pin, in every position is in the projection of the median plane of the head, and perpendicular to the line of sight. If in any position above given, it be inclined away from the observer eight degrees, the images become parallel showing that the outward torsion adapts the eye for single vision of all points of either a line or surface inclined eight degrees away from the observer, as demonstrated by Meissner and Le Conte. But in the primary position, this outward torsion also rotates the horizontal meridians of the retina, so that they do not coincide with a horizontal line, situated in a plane passing through the hat-pin. If this line or plane be so rotated on a vertical axis, that its right end is nearer the observer than the left, it will coincide with the horizontal meridian of the right eye, but by so much, it will coincide *less* with that of the left eye. But the convergence of each eye has the same effect as if the right and left ends of the line were brought nearer the observer, and the result is to make the horizontal line coincide with the horizontal meridian of each retina. If there were no rotation outward on the visual axis, convergence would render horizontal lines incoincident with the horizontal meridians, hence such rotation is a provision for preserving corresponding

points of the retina and a surface of single vision in the immediate field of fixation, especially in the usual direction of fixation, that is, downward in convergence, when the interni, inferior recti, sphincter iridis and ciliary muscle, are in synergetic contraction, while the plane of vision is slightly inclined away from the individual above.

4. The use of prisms is misleading because:

(*a*) The Maddox prism of six degrees (used by Dr. Savage), produces so much verticle separation of the lines, that many persons fail to detect the lack of parallelism, but quickly detect it by the above described sliding pin test. This will partly account for Dr. Savage's failure to detect torsion in more than 25% of those examined. A weaker single prism (3 degrees) is preferable. (*b*) The prisms render manifest, exophoria in accomodation; convergence in the median line is thus lost, and by it torsion is produced. I have found this a serious obstacle to the demonstration of torsion when the exophoria is marked, this will undoubtedly account for another quota of Dr. Savage's failures.

(*c*) To appreciate the distortions of double prisms, draw a line six inches long with a dot at its middle, on a card, and hold it in the median line about fourteen inches away. Close the left eye, and place a six degree Maddox (double) prism before the right, so that the line of junction of the two prisms is across the pupil, and perpendicular to the visual line when the eye looks straight ahead. Now look at the dot. Two lines are seen converging toward the right, and on opening the left eye, the middle line, now seen converging to the right with the lowest line, indicates outward torsion, but generally appears parallel to the top line, thus indicating abscence of torsion. Hence, if the patient have right hyperphoria, the middle line will be nearer the top one and the patient will say there is parallelism. Viewed straight ahead, as they should be, the top and bottom lines are parallel, and the dip of the middle line, if detected,

indicates outward torsion when compared with either. The same conditions, but reversed, are produced when the prism is over the left eye, and when it is rotated on its vertical axis to the right. (*d*) Torsion can often be demonstrated to the patient when he cannot at once detect it with the three degree Maddox prism, by moving it, at intervals, up and down before the eye, producing quick changes from base up to base down. In my own case, the dip is much greater with the prism base up before each eye, than with it base down. (*e*) I have never failed to demonstrate torsion by prisms, but the sliding pin test always quickly renders it apparent to all persons examined. In contrast to the prism test, binocular vison is in no way disturbed by this test; it is, for this reason, the more convincing as a proof of physiological torsion.

In conclusion: Dr. Price (Ophthalmic Record, Nov., 1894, page 198), after quoting my statement that outward torsion in convergence has been established as physiological for twenty years (Hering, Le Conte, Meissner), continues: "Does this argue anything against this theory of cyclophoria? Not at all." Dr. Price is to be congratulated upon arriving at this complacent conclusion in the face of the united experimental proofs of three such eminent authorities, of whom, Meissner and Le Conte, each ignorant of the researches of the other, reached the same result by different methods. However, I will quote from Dr. Maddox's article, "Latent Torsion of the Eyes" (*Ophthalmic Review*, June, 1894), previously quoted by Dr. Price (Ophthalmic Record, Aug. 1894): "* * I do not think torsional anomalies should ever be diagonosed without also making a *distant vision* test with a rotating prism, etc. * * It is safer, however I think, not to commit ourselves entirely to either 'insufficiency' or 'over-action' of the obliques, since other muscles besides the obliques are concerned in torsion. * * * As regards latent torsion, it is important to bear in mind that in *near* vission, *apparent* insufficiency of the obliques is just as physiologi-

cal as latent deficiency of convergence, and in distant vision slight deviations are not unphysiological."

I believe I have stated the main objectionable influences as Dr. Savage wished. It remains for me to repeat once more that he has not yet submitted adequate *clinical* evidence of the truth of his theories, since reports of cases, to form a just estimate of their value, should include such data as refraction under atropia (*not homatropine*), instilled for four or more days, the details of muscular tests, maxium accommodation, maxium convergence, range of accommodation and convergence, the relative ranges of the same, and the general health of the patient at the times of examination. This may seem too much to require, but a scientific paper should be exact, even to detail, and asthenopia has many causes. I have not here discussed the theory of compensatory action of the obliques in oblique astigmatism, because, even if such compensation occurred, the lateral recti, as I have shown in proposition 3, would be the ones principally involved.

Finally, I invite Dr. Savage to meet the physiological *facts* and experimental proofs I have given in my former paper (which he has not yet done), as well as those contained in the present one.

THE IMPORTANCE OF MAINTAINING EQUAL ROTATIONS OF THE EYES AFTER OPERATIONS ON THE OCULAR MUSCLES.*

By GEORGE T. STEVENS, New York.

A most unfortunate path to error in that field of ophthalmology which deals with the correlative positions of the two eyes lies in the misleading expression "the squinting eye."

In all the literature of strabismus in text-books from the time of Strohmeyer and Dieffenbach until now, attention has been

*Read in Section of Ophthalmology of the British Medical Association at Bristol, 1894.

especially directed to the "squinting eye" and the treatment which must be directed to it.

As a rule, in concomitant strabismus, a rule with few exceptions (not considering the cases which are strictly of a pathological character), there is no squinting eye, if by that expression a deviation confined either wholly or largely to one eye is intended. Strabismus concomitans is a mutual relation between the eyes, and if there is an actual deviation of one eye, inward or outward, that deviation is almost universally shared by the other eye. If an ordinary case of such strabismus is examined with care, several conspicuous facts must be brought to our attention.

1st. The familiar "secondary" squint when the habitually deviating eye is forced to fix the object.

2nd. The much less familiar fact that if each eye is caused to rotate to its extreme ability toward the nasal or toward the temporal side, the rotations are in many cases strictly equal, and in cases where slightly unequal rotation is found, it is not usually on account of the comparative tensions of the lateral recti, but from causes to which reference will be made as we proceed.

Suppose the examination to be in an ordinary case of converging strabismus: If we cause the patient to roll first each eye as far toward the nose as it is possible, we can observe that in the case of each eye, the rotation is excessive and that the excess in one case equals that in the other; then, if the eyes are alternately directed as far as possible to the temporal side, there is usually little difference and the restriction, if one exist, may be not in the rotation of the squinting eye, but of the eye habitually fixed. If then there occurs a secondary squint when the usually deviating eye is covered, and if the rotations are, in case of each eye, excessive and equal in the direction of the deviation, why should one eye habitually remain as the eye of fixation while the other habitually deviates?

Let us suppose a perfectly uncomplicated case of converging strabismus, one in which the nasal rotations are each excessive and equal, and in which the tensions of the vertically acting muscles are also equal.; in such a case, either alternating strabismus will occur, or if one eye is selected for habitual fixation, it will be that which is more advantageously constituted for accommodation at the point of fixation. In certain cases in which one eye is emmetropic or nearly so, while the other is moderately myopic, the fixing eye for distance is the emmetropic one, while that for near points is the myopic eye. Usually the reason for habitual fixation of one eye is found in the fact that the patient selects the eye which is best suited to clear vision. If there is a difference in the refractive states, the eye most nearly approaching emmetropia, is selected as the distant fixation eye. The fact of such a selection does not indicate a better or a different state of muscular tensions on the part of the selected eye. Nor is the eye which is not selected for fixation on that account, more a squinting eye than the one usually employed for fixation.

Lateral strabismus, as I have at various times indicated, is not infrequently the result of a difference in the tensions of the vertically acting muscles. This difference in the relative tension vertically is a most annoying and perplexing one to the patient. One of the strongest of the muscular instincts is to see vertical objects vertical, and horizontal objects horizontal. When the power to see objects thus is absent, the power of maintaining the equilibrium of the individual is compromised. One may see double in the horizontal direction with relative comfort compared with the confusion from diplopia in the vertical or oblique direction. In a tendency toward vertical diplopia, one of two means will be attempted for relief. The person subject to the defect will perhaps acquire the faculty of mental suppression of one image; unless the deviation in this vertical direction is considerable, this is difficult to accomplish.

If this effort fails, the patient may, by placing much stress upon the vertically acting muscles, bring the images to a level; at the same time, by virtue of the adducting action of these muscles, he may force a deviation inward. This inward deviation may in many cases be encouraged by the fact that in conjunction with the unequal vertical tension, there is also a moderate excess of tension of the interni over the externi. When the habit of such a lateral deviation has become once established, the force directed to bringing the images to the horizontal plane may be in some measure relaxed, for with a squint inwards or outwards, the urgency for maintaining horizontal images is modified. When the images are far removed from each other by such a squint the ability to suppress one of them increases.

Another, and a very frequent cause of squint is found in an anomalous tension of corresponding vertically acting muscles, acting inordinately upwards or downwards either equally or unequally. In such cases the excess of tension of these vertically acting muscles induces a converging squint or, if the excess is very unequal, a diverging one.

To these two classes, in which converging squint results, first, from the efforts of the patient to free himself from the annoyance of vertical or oblique diplopia, and second, from excess of tension of all the vertically acting muscles belong those cases in which convex glasses afford temporary relief. In such cases, if the tensions of the counteracting rectus superior and rectus inferior of one eye should be materially greater than of the other, the lateral rotation of that eye might be somewhat restricted outwardly or increased nasalwards and thus lead to the supposition that the external rectus is less, or the internal rectus more, potent than the corresponding muscle of the other eye.

In this unequal vertical tension also is found an explanation of some marked exceptions to the rule to which I have already

referred, that the eye most nearly emmetropic is usually the fixing eye.

In some cases of decided hypertropia (deviation of one visual line above the other), the upward turning eye is the best eye; yet on account of the difficulty of holding this eye in the proper line for fixation, the astigmatic or otherwise ametropic eye will be selected as the most advantageous eye for fixation, and the well constructed eye will squint.

It was not the original design of this paper to discuss the causes of strabismus, but I have ventured upon this introduction somewhat at length, in order to base the considerations of treatment not upon apparent and superficial facts, but upon the fundamental principles with which we have to deal.

However important may be the removal of the deformity of strabismus from the cosmetic point of view, the supreme motive for strabismus corrections should be the establishing of binocular vision. If one believes that the ordinary perfunctory division of an internal rectus of the squinting eye in converging strabismus often establishes such vision, he will be undeceived if he make many careful examinations in cases which have been subjected to such surgical treatment. Continuous binocular vision can only exist where there is approximate equality of tension of corresponding muscles of the two eyes, and easy binocular vision is only possible when the nervous impulse for the direction of one eye is exactly similar to that for the other. Corresponding action of two interni cannot be maintained, and in some cases cannot be even temporarily induced in a case in which the rotating power of one internus has been reduced, while the other remains intact and excessive.

Here lies the secret of von Graefe's cases of "antipathy to single vision," cases which are infinitely more common than is generally supposed. When one internus had been cut, and another retained its excessive tension, and especially when the image of one eye lay normally in a higher plane than the other,

or where there was great excess of action of all the vertically drawing muscles, there could be no permanent union of images. Few cases operated by the usual methods have any practical binocular vision. By careful attention, not to the gross and most conspicuous phenomenon of strabismus, the lateral deviation, but to the essential and important relations of the tensions in vertical as well as horizontal direction, the failure to obtain practical binocular vision which is the extremely common result of strabismus operations may be practically eliminated. An operation properly performed on a superior rectus will often completely relieve a moderate converging or diverging strabismus by removing the necessity for the squint, as will also in a good proportion of cases a relaxation of the two corresponding upper or lower recti.

Some years ago, I expressed my conviction that the condition of antipathy to single vision, as described by von Graefe, and by subsequent authors, depends not upon lesions of the brain, or upon faulty projection of the images from the retina, but upon unequal tensions of corresponding muscles under the influence of corresponding nerve impulses directed to them. Abundant experience and research in this field has since then fully confirmed this view. It has also led me to see that even in cases in which extremely moderate modification of the tension of a single lateral rectus has been made with the view of relieving conditions of heterophoria, that is, of conditions of less grade than strabismus, a tension of one muscle unequal to that of the corresponding muscle, results, after the first relief from the primary defect, in much perplexity of vision and often in much nervous distress.

If these principles are conceded, we should abandon the idea of correcting any lateral squint by an operation on a single muscle. Even if the rotation is to be affected only to the extent of a few degrees, the equilibrium should be maintained. But if the correction of slight strabismus, or even of esophoria,

or of exophoria by relaxation of a single muscle is to be avoided, how much more must we reject the idea of doing a tenotomy on an internal rectus and an advancement of the external rectus of the same eye, as has been proposed and practiced, while the so-called but mis-called non-squinting eye remains with its original tensions.

The precept which I would earnestly impress, is one which I have already on former occasions urged, viz., that, "*Every modification of a lateral muscle by relaxation or by shortening which can in any degree affect the rotation of one eye should in every instance be accompanied by an exactly equivalent modification of the corresponding muscle of the other eye.*"*

*Stevens: Archives of Ophthalmology, 1889, p. 407.

LATENT TORSION OF THE EYES.

By ERNEST E. MADDOX, M.D., Edinburgh, Scotland.

[This paper by Dr. Maddox has been quoted by writers in the RECORD several times. To show the reader exactly what he did say, the paper is republished from the June (1894) issue of the *Ophthalmic Review*.—EDITOR.]

Manifest torsion of the eye in cases of ocular paralysis has been well studied, but the physiology of torsion, apart from paralysis, is not yet fully understood. Le Conte, in his admirable book on "Sight" (1881), relates how he can prove outward torsion of his two eyes during *convergence* of the visual axis, when the desire for single vision is suspended. He produced the requisite dissociation by his rare power of creating, at will, a strong convergent strabismus, and quotes Meissner as having previously demonstrated the same outward torsion by a different and more doubtful method in 1858. Le Conte found great difficulty in applying his test to others, because so few possessed his power of dissociating their eyes so as to produce a convergent squint. He says: "To generalise this as a law of ocular motion I have found extremely difficulty because there

are so few persons who are able to verify the results." There is a plan, however, which I adopted when I first read his book, which enabled me to confirm his results on myself, and which anyone can easily manage. With a prism of 6° d., edge out, before the right eye, look at a vertical line drawn on a piece of paper, and held at the near point of vision. Then suddenly rotate the prism to the vertical. The two images of the line are seen to cross each other at a small angle as they meet, before the eyes have time to fuse them. By rapidly rotating the prism, sufficient time for fusion is not given, and the angle can be easily observed. The experiment may be varied by holding the line horizontal when a weaker prism held vertical to start with will suffice. A variation in the test is to draw a straight dotted line, and also a continuous red line parallel with it. These should be held horizontally with a vertical prism before the right eye of such a strength as to bring the false image of the dotted line over the true image of the red. There is so little tendency to fuse these two that the slightest angle between them can be leisurely observed. By drawing the two lines at various inclinations to each other, instead of being parallel, the angle can be accurately measured. Dr. Savage's plan is to use my double prism before one eye of the patient, while a horizontal line at eighteen inches is made the object of fixation, and this is really a very good test.

But I do not think torsional anomalies should ever be diagnosed without also making a *distant vision* test. With a rotating prism, any straight line on a uniform ground, at 6m. distance, will serve the same purpose as the near vision test, or the patient can be made to look at a flame, 6m. distant, through a glass rod, six inches long, and $\frac{3}{4}$ in. thick, held horizontally before both eyes. One streak of light is then visible, till resolved into two by placing a 6° d. prism, edge out, before the right eye. Rapid rotation of the prism to the vertical and back again enables one to see if the two streaks of light are

parallel or at an angle. In my own case, their upper ends are slightly inclined to each other, showing slight lateral torsion in whatever position the head is held. Le Conte showed that, in near vision, the outward rotation of the eyes increases on looking upwards and decreases on looking downwards, and this made him attribute the phenomenon to over-action of the inferior obliques. It is safer, however, I think, not to commit ourselves entirely to either "insufficiency" or "over-action" of the obliques, since other muscles besides the obliques are concerned in torsion. Moreover, I prefer to think of the faculty of torsion, when exerted in the interests of fusion, as a definite coordinative faculty just as convergence is, so that it seems to me better to speak of latent torsion, rather than of "insufficiency of the obliques."

Dr. Savage has shown that a certain amount of corrective torsion, or, to substitute his own words, of "harmonious symmetrical action of the obliques" is necessary when oblique astigmatism exists in both eyes, since the retinal images of vertical objects are not themselves vertical, and that correcting cylinders which make these images vertical alter the torsional requirements. These facts may well have the practical bearing he claims for them. Of latent torsional anomalies sufficiently great to be called pathological, I have no experience, apart from definite paralysis of individual muscles, and therefore confine my remarks to the physiology of the subject. The torsion of the eye, as we all know, is of much value in the differential diagnosis between paralysis of the superior oblique and inferior rectus, as well as in the attempt to discover whether the fourth nerve is involved in a case of paralysis of the third. How to measure this torsion by the rod-test I have already shown in a previous paper. As regards latent torsion, it is important to bear in mind that in *near* vision, *apparent* insufficiency of the obliques is just as physiological as latent deficiency of convergence, and in distant vision slight deviations

are not unphysiological. Only extreme cases should, I think, be regarded as likely to cause asthenopia, but as they are not personally familiar to me, I cannot express myself strongly on the point.—*Ophthalmic Review.*

THE IMPORTANCE OF ACTIVE TREATMENT OF THE NASO-PHARYNX IN THE TREATMENT OF OBSTRUCTIVE DISEASE OF THE LACHRYMAL PASSAGES.

By C. A. VEASEY, M.D.

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That obstructive disease of the lachrymal passages are frequently caused by some intra-nasal lesion is generally conceded by the majority of ophthalmic surgeons. That, in a great many cases in which the intra-nasal affection, if there be such, is not the cause of the disease of the lachrymal passages, it is a potent factor in keeping up the inflammation in them, and in preventing the successful treatment, if such be directed against the lachrymal passages alone, is also generally understood. So it would seem almost superfluous for the author to add to the already large accumulation of literature on this subject were it not for the fact that he has in the past few years had the opportunity of treating a number of such cases of obstructive lachrymal disease where there were ascociated intra-nasal lesions, and in which, before coming under his observation, unsuccessful attempts had been made to cure the former without any attention to the latter, and in which as soon as the proper intra-nasal treatment was instituted the lachrymal affection was rapidly cured.

It is not claimed that all cases of obstructive disease of the lachrymal ducts are due to some trouble within the nose, nor that all cases can be rapidly cured; for, as is well-known, they are among the most difficult, and sometimes the most tedious, cases with which the ophthalmic surgeon has to deal. But it is

claimed that in a great many cases the cause is primarily within the nose, and that the treatment of the ducts alone in these cases will prove ineffectual; and, that when the origin of the trouble is not within the nose, nevertheless there being some co-existing intra-nasal disease, the most prompt and permanent eradication of the disease of the lachrymal passages that can be obtained, can be effected by directing treatment against the intra-nasal condition as well as against the disease of the passages themselves.

In the treatment of any disease of the lachrymal duct it is of course necessary, in addition to the treatment of the duct itself, to make a thorough examination of the nares and naso-pharynx and if any disease be found to direct the treatment against it as well as against the former lesion. In many cases in which there is only a slight inflammation of the mucous membrane, having extended, perhaps, into the lower portion of the nasal duct, all that will be required is the spraying of the parts once or twice daily with a mild alkaline and astringent solution. The following will be found very useful, and can be employed by the patient at hôme with the use of a bulb-atomizer:

℞

Acidi Borici,
Sodii Boratis,
Sodii Bicarbonat, $\overline{aa}$ grs. xii.
Glycerinæ ʒ ii.
Aquæ Destillatæ q. s. ℥ iii.

℔. Use in Atomizer.

Should the mucous membrane be more severely inflamed and swollen, the treatment must be somewhat more elaborate. After cleaning the nares with the alkaline solution the author employs a spray of antipyrin (grs. xx—℥ i), preceding it with a spray of cocaine (3% solution) if necessary, which causes an immediate contraction of the swollen membrane, lasting for a

variable period, and then applies with a bit of absorbent cotton wrapped on a probe, or applicator, either the compound tincture of benzoin or the following, which is formula of Sajous:

℞

Iodinii, ʒ ss.
Acidi Tannici, ℥ ss.
Aquæ, O ss.
Mix, filter and evaporate to ℥ ii, and add
Glycerinæ, ℥ iv.
Acidi Carbol. liq. ♏ ii.

Immediately afterward a spray of some bland oil, like albolene, to which has been added menthol (grs. x-xx to ℥ i), will complete the nasal treatment, and give a most refreshing sensation to the patient.

Should there be any bony spurs, or polypi, or chronic hypertrophies, or any such severe lesion, and to these the appended list of cases more particularly refers, the patient should be referred to the rhinologist for the proper surgical interference. By attention to these intra-nasal affections it is frequently possible to cure a case of obstructive lachrymal disease in half the time it would take were they not attended to, and relapses are not nearly so frequent.

The following are a few of the cases that will serve to illustrate the points above referred to:

Case 1.—*Purulent dacryo-cystitis; hypertrophy of right lower turbinated bone.*—F. E., aged twenty-eight, consulted me, for lachrymal obstruction saying that for the past eight years he had been able at times to express some purulent material from the right lower canaliculus, and that the tears flowed over the right cheek almost constantly. Four years ago his canaliculus was opened and probes passed, but the obstruction, though being better for the time, always returned. His nares were examined, and the left side found to be normal; but the right lower turbinated bone was considerably enlarged causing some pressure on the swollen mucous membrane near the orifice of the duct. The hypertrophy was removed, the inflamed mucous membrane treated with sooth-

ing applications, probes were passed into the duct, and the latter washed out, daily at first, then less frequently, with antiseptic and astringent solutions, and in a few weeks the trouble entirely disappeared. Although one and a half years have elapsed, the patient reports that he has never had any return of the disease.

Case II.—*Purulent dacryo-cystitis; hypertrophy of inferior turbinated bone on both sides with a spur of the septum on the right.*—A. S., age forty-four, married, presented herself for the treatment of obstructive inflammation of both lachrymal ducts characterized by a profuse discharge of pus from both upper and lower punctæ lachrymæ of each eye, with almost constant epiphora, these symptoms having been present for several years. Both lower canaliculi had been opened about two years before and the ducts washed, but the patient claimed that no fluids had ever passed into the nose. An attempt was made to pass probes, but it was impossible to get one through the duct on the right side, though with considerable difficulty one was introduced into the left duct, and fluid passed through into the nose.

An examination of the nares revealed a very much enlarged inferior turbinate on each side, and in addition a large spur of the septum on the right pressing on the hypertrophied turbinate. The hypertrophies and the spur were removed, the nares treated, and in a short time a probe was passed on the right side. The ducts were then treated in the usual manner with antiseptic and astringent washes and soon the purulent discharge and epiphora entirely ceased. The patient informed me by letter a few days since that there had been no relapse.

Case III.—*Catarrhal dacryo-cystitis; hypertrophic rhinitis with deviation of the septum to the left.*—I. W., age forty-six, married woman, consulted me for a small abcess of lower lid of right eye. During the examination it was seen that the left lower canaliculus had been opened, and that considerable mucoid discharge could still be expressed by pressure over the left lachrymal sac. Patient stated she had been treated three different times but had obtained only temporary relief. The intra-nasal examination showed a marked hypertrophic rhinitis on both sides, probably made much worse by a deviation of the septum towards the left. This condition was remedied by operation, and afterwards the duct was treated, the result being that the patient was cured of a chronic affection and has had no relapse seven months later.

Case IV.—*Epiphora; polypus; hypertrophy of right inferior turbinate.*—C. H., aged thirty-eight, male, came to the eye dispensary of the Jefferson Medical College Hospital, service of Dr. de Schweinitz, for the treat-

ment of an extensive swelling of the lower lid and cheek of the right side of two days duration. Nothing could be expressed from the canaliculus but the parts were exceedingly painful, and there was marked epiphora which the patient said had existed for several months. Vision and accommodation were good. He was given Basham's mixture, told to employ hot compresses at frequent intervals, and sent to the throat department for the nasal examination. There was found a polypus with hypertrophy of the lower turbinate, both on the right side. The polypus was removed at once. In three days the inflammatory condition of the lid and face had subsided, and canaliculus was opened, probes passed and the duct washed out, the fluids readily passing into the nose. The mucous membrane of the duct was somewhat swollen but there were no strictures. In about ten days, however, the patient had a relapse, his lid and face being in as bad a condition as before. At this time the hypertrophy of the turbinate was removed and the duct treated as before. The patient is still being seen once a month but there has been no return of the swelling, and the epiphora has disappeared.

Case V.—*Lachrymal abcess; syphilitic ulceration of septum; marks of former ulceration in pharynx.*—M. S., aged thirty-two, unmarried male, was sent to me for treatment of lachrymal abcess on right side of face. There were numerous scars on both sides over the region of the lachrymal sac, and the patient said he had had abcesses of the same kind, four times within the two years previous. Admitted contracting syphilis four years ago. The abcess was opened over the sac and treated with hot antiseptic compresses, and antiseptic irrigations, and he was given internally Basham's mixture. As soon as the acute inflammation had subsided the canaliculi were opened on both sides, there being some discharge from the left, with epiphora, probes were passed, and the nasal examination made when it was found that there was a large sharp cut ulcer which had eaten through the septum. There was chronic hypertropic rhinitis and the pharynx was also chronically inflamed, there being numerous scars indicating old ulcerations. He was placed on antisyphilitic treatment, the nasal ducts and the nares were properly treated, and there has been no return of the disease except once, at which time he had neglected the internal medication for some weeks before. Upon resuming the remedies the relapse disappeared.

Many other cases could be added to the above, but these seem sufficient to emphasize the following points:

1. In beginning the treatment of any case of obstructive disease of the lachrymal passages, in addition to the passing of probes and the cleansing of the duct with solutions, it is essential that a thorough examination of the nares be made.

2. If a simple inflammation of the nares be found it should be treated by means of appropriate simple methods at the same time that the lachrymal duct is being treated from above.

3. If any more serious complications be observed such as require operative interference, this interference should be undertaken at once, as the disease of the lachrymal duct will get well much more quickly if this be done.

4. It should not be forgotten that many cases, to a very great extent, are due to constitutional disturbance, and that in such cases the proper internal remedies must be administered during the local treatment of the obstructive disease.

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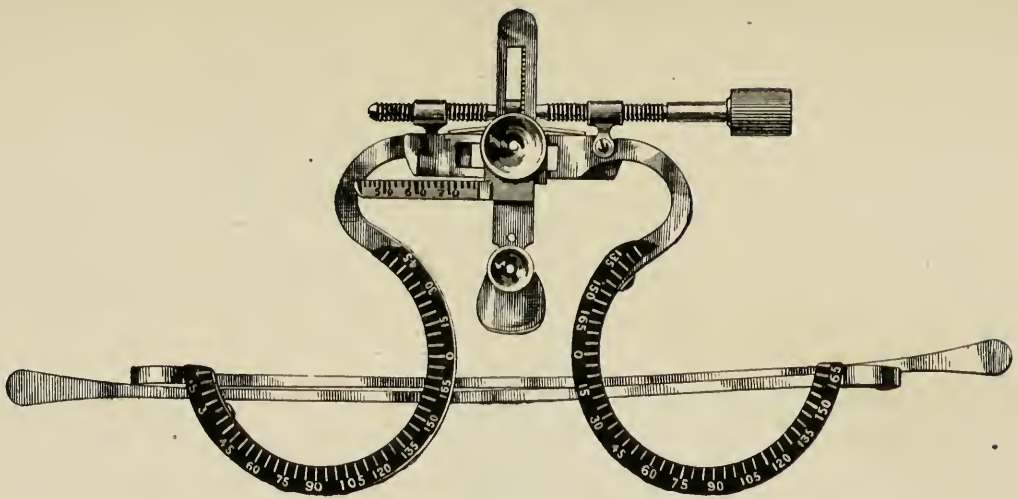

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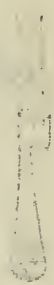

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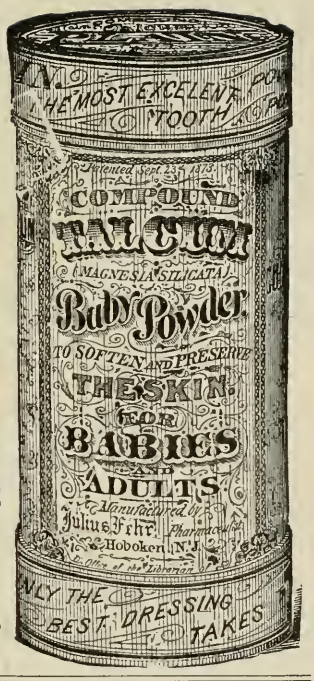

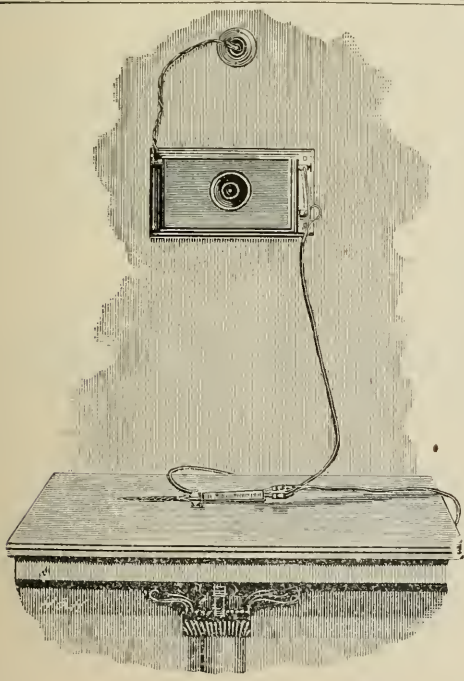

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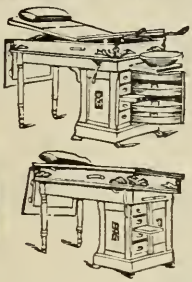

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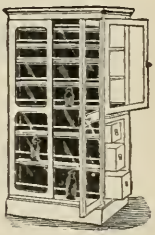

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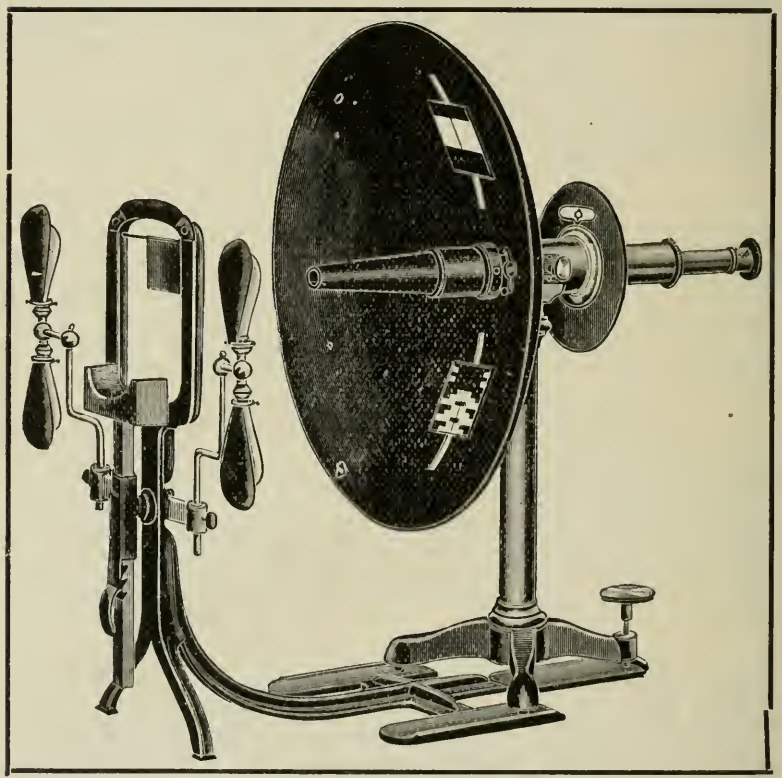

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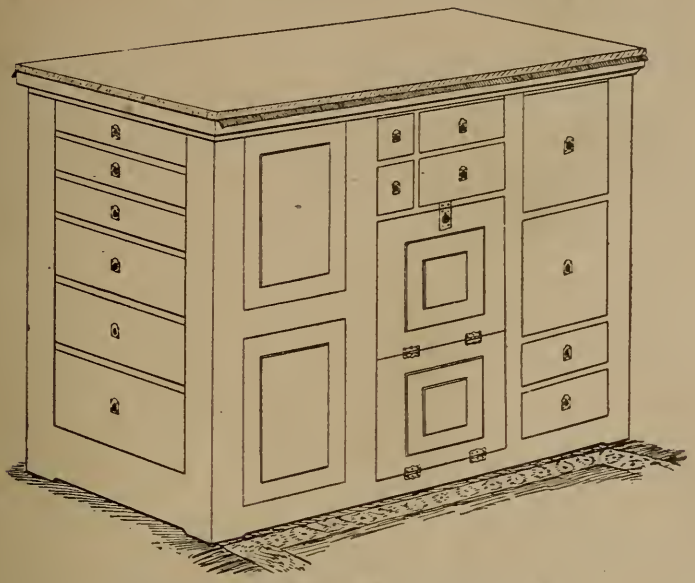

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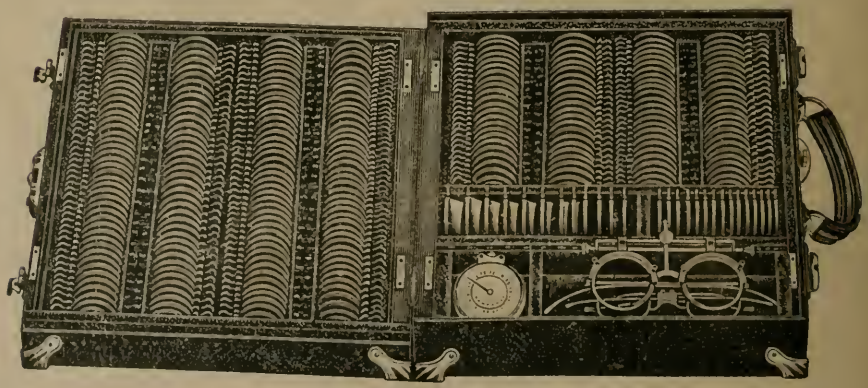

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